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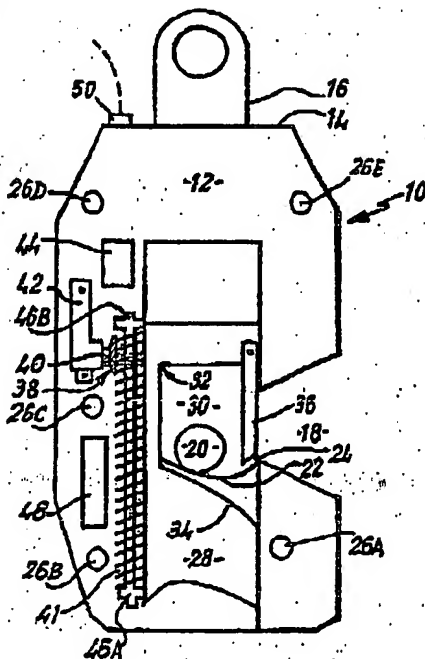
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[Continued on next page]

(54) Title: RELEASE HOOK

(57) Abstract: A release hook (10) for selectively releasing a load sup-  
ported on the hook (10). The hook (10) includes an ejector lever (28)  
which is actuated by a motor (42) and gearing mechanism (38) located  
within the hook (10). This arrangement provides a relatively lightweight  
and compact hook (10). Embodiments of gearing mechanisms (38) are  
described as is a catch to hold (36) a cable (20) or the like in the hook  
(10) and various pad-eyes (16) which advantageously swivel to allow the  
hook (10) to rotate relative to a crane block.



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1 Release hook

2

3 The present invention relates to hooks used on cranes and  
4 lifts and in particular, although not exclusively, to a  
5 hook that selectively releases a load being supported by  
6 the hook.

7

8 It has been recognised in the prior art that for many  
9 environments such as offshore oil and gas exploration,  
10 the use of an automated release mechanism for a hook can  
11 be advantageous. In particular, this allows the operator  
12 to be remote from the hook when the load is released  
13 providing for a safer working environment.

14

15 The original hooks which incorporated release mechanisms  
16 automatically released when the load reached the ground  
17 and the cable tension slackened. Unfortunately, a  
18 disadvantage of these systems is that the load can only  
19 be released when it is set down and also, if the load is  
20 placed in the wrong position it has to be manually placed  
21 back upon the hook for it to be moved again.

22

23 A remotely controlled crane hook which provides for  
24 selective ejection of a load from a hook, is proposed in

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1 GB Patent Application No 2,293,497. In this hook a  
2 sliding ejector lever is used under the cable or guide  
3 ropes. To operate the hook, a hydraulic ram moves the  
4 ejector lever up, thereby ejecting the guide ropes over a  
5 retaining edge of the hook. Though this hook has the  
6 advantage that it can be remotely operated to allow the  
7 crane operator to be distant from the hook whilst  
8 selectively choosing when the load is released, it has a  
9 major disadvantage in its size and weight. To operate the  
10 ejector it requires a housing including a motor, a  
11 hydraulic pump driven by the motor, a power supply for  
12 the motor, a hydraulic ram driven by the hydraulic pump  
13 together with the necessary control circuitry for remote  
14 operation. Such a hook including these components is  
15 typically one metre in length and one metre in diameter  
16 with a weight of around 500 kg. As this hook is so large  
17 and heavy it is difficult for a crane operator to  
18 manoeuvre the hook to attach a load. A further  
19 disadvantage of this hook is that it is welded together  
20 to form a one piece body containing the ejector lever.  
21 Such an arrangement prevents the hook being disassembled  
22 for repair.

23  
24 One hook which overcomes these disadvantages is described  
25 in International Patent Application No WO98/37009. This  
26 Application discloses a release mechanism within a hook  
27 for use in supporting a load from a crane. The hook is  
28 again remotely operable and the load is released by an  
29 identical ejector lever mechanism operated by the  
30 standard hydraulic ram. The advantage of this system is  
31 that the power and control means for the hydraulic ram is  
32 located in a housing connected to the hook via a support  
33 link. While this reduces the weight on the hook, making

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3

1 the hook more manageable for an operator, this system has  
2 the disadvantage that the hook including the power  
3 control housing is approximately 6 metres in length. The  
4 connections via the support link between the housing and  
5 the hook prevent the hook from independently swivelling  
6 and thus the full length and weight of the combination  
7 must by manoeuvred to swivel the hook to the correct  
8 direction for connecting a cable onto the hook.

9  
10 It is an object of the present invention to provide a  
11 hook for use in supporting a load from a crane, which  
12 obviates or mitigates one or more disadvantages of the  
13 prior art.

14  
15 It is a further object of the present invention to  
16 provide a hook for use in supporting a load from a crane,  
17 the hook being capable of selectively releasing the load  
18 by an ejector lever, the ejector lever not being operated  
19 by hydraulic means. By removing the hydraulic means to  
20 operate the ejector lever, the weight and dimensions of  
21 the hook can be reduced to make a more lightweight and  
22 compact hook, which is more manoeuvrable and safer to  
23 operate.

24  
25 It is a further object of the present invention to  
26 provide a hook for use in supporting a load from a crane,  
27 the hook being capable of selectively releasing the load  
28 by an ejector lever, the ejector lever being operated by  
29 a motor and gearing means located within the hook.

30  
31 It is an object of at least one embodiment of the present  
32 invention to provide a hook for use in supporting a load  
33 from a crane, the hook being capable of selectively

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4

1 releasing the load by an ejector lever operated via  
2 remote control.

3

4 According to a first aspect of the present invention,  
5 there is provided a release hook for selectively  
6 releasing a load supported on the hook, the hook  
7 including an ejector lever for releasing the load from  
8 the hook upon actuation of the ejector lever wherein  
9 actuation of the ejector lever is provided by a motor and  
10 gearing means located adjacent the ejector lever.

11

12 As the motor and gears take up less space than the  
13 hydraulic ram and its associated power supplies, the hook  
14 is therefore lightweight and the gearing means and motor  
15 can be housed within a hook of relatively small  
16 dimensions and weight.

17

18 Preferably, the motor is remotely operated. More  
19 preferably the remote operation is by a wireless  
20 telemetry system as is known in the art. Preferably, the  
21 motor is an electric motor driven from a battery housed  
22 in the hook.

23

24 Preferably, the hook comprises a housing having two  
25 interconnected generally 'C' shaped sections with the  
26 ejector lever being located at a base of the 'C' between  
27 the sections. The sections may be bolted together.

28 Preferably, also the hook includes a catch. The catch  
29 may be located across an opening of the hook where the  
30 cable carrying the load is inserted. The catch may  
31 comprise an elongate member attached to the ejector  
32 lever. The catch prevents the cable being prematurely

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1 ejected when the hook is moved. Thus, the catch actively  
2 retains the cable within the hook.

3

4 Advantageously the catch may integral with the ejector  
5 lever, the catch and ejector lever being oppositely  
6 opposed on a pivot. In this arrangement the catch will  
7 swing away from the hook when the ejector is actuated.  
8 The catch can then be used to guide a cable, ring or the  
9 like onto the hook as the ejector lever is moved to its  
10 deactivated position. Thus for safety, the cable, ring  
11 or the like can be mounted on the hook without the need  
12 for personnel to enter the area around the hook.

13

14 Preferably, the gearing means comprises a rack and  
15 pinion, the pinion being operable via the motor. The  
16 rack is preferably located on the ejector lever. In this  
17 manner, rotation of the motor causes mutual engagement of  
18 teeth in the pinion with teeth on the rack and  
19 consequently the ejector lever is moved linearly in  
20 relation to the rotating pinion of the motor. Most  
21 preferably, this linear motion is vertical on the hook,  
22 raising the ejector lever towards the opening.

23

24 Alternatively, the gearing means may comprise a worm  
25 gear. In this arrangement the motor will turn the worm  
26 whose screw thread is located against matching notches on  
27 an edge of the ejector lever. Thus, operation of the  
28 motor allows the ejector lever to be raised or lowered  
29 along the linear axis of the worm. This gearing means  
30 has the additional advantage that the motor need only  
31 turn a small amount to provide a significant distance  
32 change on the ejector lever.

33

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1 Preferably the gearing means may comprise a drive  
2 sprocket, driven by the motor to rotate the ejector lever  
3 on a pivot. Preferably also the gearing means rotates the  
4 catch with the ejector lever.

5  
6 Preferably also, the hook includes a pad-eye which may be  
7 referred to as a clevis. The pad-eye provides the  
8 contact between the hook and a crane. In one embodiment  
9 of the present invention the pad-eye includes an eye-let  
10 aperture such that a link may be made between the pad-eye  
11 and a crane block of the crane. In a further embodiment  
12 of the present invention the pad-eye comprises a shaft  
13 including connection means to a crane block. Preferably  
14 the connection means is a screw thread on the shaft and a  
15 matching threaded recess in the crane block. Thus, the  
16 hook may be located at or within the crane block.

17  
18 Advantageously the pad-eye is swivel mounted on a top of  
19 the hook. The pad-eye may include a base of greater  
20 diameter than the shaft, such that the base is retained  
21 between the two sections of the housing while remaining  
22 rotatable with respect to the housing.

23  
24 Preferably the hook has dimensions of less than 17.05 x  
25 9.86 x 3 inches in height, width and depth respectively.  
26 Preferably also the hook has a weight of approximately 12  
27 to 16 kg. Preferably the hook is made of steel or the  
28 like. Advantageously the hook provides a 12 tonne lift.

29  
30 Embodiments of the present invention will now be  
31 described by way of example only with reference to the  
32 following drawings which:

33

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1 Figure 1 is a cross-sectional schematic view of a release  
2 hook according to the present invention;

3

4 Figure 2 is a cross-sectional schematic view of a release  
5 hook including a gearing means according to a first  
6 embodiment of the present invention;

7

8 Figure 3 is a cross-sectional schematic view of a release  
9 hook including a gearing means according to a second  
10 embodiment of the present invention;

11

12 Figure 4 is a cross-sectional schematic view of a release  
13 hook according to a further embodiment of the present  
14 invention;

15

16 Figure 5 is a cross-sectional view of a pad-eye of a hook  
17 according to an embodiment of the present invention; and

18

19 Figure 6 is a schematic plan view of a pad-eye of a hook  
20 according to a further embodiment of the present  
21 invention.

22

23 Reference is initially made to Figure 1 of the drawings  
24 which illustrates a release hook, generally indicated by  
25 reference numeral 10, according to the present invention,  
26 a hook 10 comprises a body 12 having a top surface 14  
27 where a pad-eye 16 is located. Pad-eye 16 will be  
28 described hereinafter. As is known in the art, pad-eyes  
29 are used for making a connection between the hook 10 and  
30 a crane block (not shown).

31

32 Body 12 has a generally "C" shaped structure, there being  
33 an opening 18 through which a cable 20 may be inserted.



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1 Within the body is a recess 22 formed past the opening  
2 over a lip 24. The lip 24 helps maintain the cable 20  
3 within recess 22. It will be appreciated that cable 20  
4 may represent any load positioned on the hook 10 to be  
5 lifted: Body 12 generally comprises 2 'C' shaped  
6 sections bolted together via bolts 26A-E. These bolts  
7 26A-E allow the body 12 to be disassembled so that access  
8 can be made to the parts therein.

9  
10 Located between the body sections is an ejector lever 28.  
11 Ejector lever 28 has a generally rectangular shape from  
12 which is cut a section 30. Section 30 has a right-angled  
13 corner portion 32 and a sloping surface 34. The ejector  
14 lever 28 may be referred to as a guillotine such that  
15 when moved upwards towards the pad-eye 16, the cable 20  
16 will be inclined to travel down the slope 34 and out of  
17 opening 18.

18  
19 Attached to ejector lever 28, is a catch 36. The catch  
20 36 provides a closing portion over recess 22. The catch  
21 36 is an elongate member having a length equal to or  
22 greater than the opening 18. The catch 36 acts as a  
23 safety mechanism in the event that the hook 10 is moved  
24 substantially during lifting, thus preventing cable 20  
25 from exiting the recess 22 until selectively requested to  
26 do so.

27  
28 At a side of ejector lever 28 is a gearing arrangement  
29 38. The gearing arrangement 38 is driven from spindle 40.  
30 This arrangement of gears ensures that when spindle 40 is  
31 turned, the gears operate the ejector lever 28 and  
32 thereby move the ejector lever in a linear motion  
33 vertically upwards or downwards towards or away from the

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9

1 pad-eye 16. The spindle 40 is controlled from an  
2 electric motor 42. The electric motor 42 is powered from  
3 a battery 44. It will be appreciated that the battery  
4 may be of any replaceable form and in the embodiment  
5 shown the battery is a 12-volt dry cell battery. The  
6 motor 42 has a right-angled motor drive which is attached  
7 to the spindle 40, being a Teflon (Trade Mark) gear which  
8 moves the ejector lever up and down on a worm, or gear  
9 41. The gear 41 is fixed to the ejector lever 28, by  
10 brass bushels 46A,B.

11  
12 The ejector lever 28 is remotely controlled. This is  
13 achieved through a telemetry system 48, housed within the  
14 body 12. A remote panel (not shown) is operated by a  
15 crane operator at a remote distance from the hook 10.  
16 Signals from the remote panel are transmitted and  
17 received via the antenna 50 located at the top 14 of the  
18 hook 10. The signals are relayed to the telemetry system  
19 48. This in turn controls the motor 42 and consequently,  
20 the gearing means 38 for movement of the ejector lever  
21 28.

22  
23 When constructed, the hook 10 has general dimensions of  
24 height less than 20 inches, width less than 10 inches and  
25 a depth less than 3 inches. In a preferred embodiment the  
26 height is 17.05 inches, width is 9.86 inches and the  
27 depth is 3 inches. In a further embodiment of the  
28 present invention, a compact hook 10 has dimensions,  
29 height 14 inches, width 8 inches and depth 2.25 inches.

30  
31 The weight of the hook is approximately 12 to 16  
32 kilograms depending on the material of construction. In  
33 the preferred embodiment the material is steel however it

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10

1 will be appreciated that many other materials and alloys  
2 thereof can be used. The hook 10 can provide a 12 tonne  
3 lift.

4  
5 In use, hook 10 is mounted on a support link (not shown)  
6 via pad-eye 16 to a crane block(not shown) of a crane. An  
7 operator pushes a cable 20, chain or the like onto the  
8 hook via opening 18 and by operation of the catch 36 the  
9 cable 20 is secured within recess 22. The load connected  
10 to the cable 20 may now be lifted by the hook 10 and  
11 moved by the crane. When the load is in the correct  
12 position, or it is determined that the load should be  
13 ejected from the hook, the operator provides a signal via  
14 their control panel located remotely from the hook 10.  
15 The signal is transmitted through antenna 50 to the  
16 telemetry system 48. System 48 transmits a signal to  
17 start the motor 42 which is powered from the 12 volt  
18 battery 44. The motor 42 drives spindle 40 whose rotation  
19 causes the gearing 38 to be moved and thereby the ejector  
20 lever 28 is moved vertically towards the pad-eye 16. As  
21 the ejector lever 28 moves, cable 20 engages with the  
22 sloping surface 34. At the same time, catch 36 is moved  
23 away from opening 18 and consequently, cable 20 is  
24 ejected through opening 18 in a guillotine like motion.  
25 The load is then separate from the hook and the ejector  
26 lever can be signalled to relocate into the recess.

27  
28 Reference is now made to Figure 2 of the drawings, which  
29 illustrates a hook 10, having a gearing arrangement 38A  
30 according to a first embodiment of the present invention.  
31 Identical parts to those of Figure 1 have been given the  
32 same reference numeral while like parts are given the  
33 same reference numeral but are now suffixed 'A'. In this

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11

1 embodiment motor 42 drives a spindle 40A which is now  
2 mounted linearly to worm 41A. Thus spindle 40A turns  
3 worm 41A. Worm 41A engages with teeth 52, which are  
4 mounted on a side of the ejector lever 28. In this  
5 embodiment the ejector lever 28 is moved vertically by  
6 the engagement of the teeth 52 with the worm 41A.

7  
8 A further gearing arrangement according to a second  
9 embodiment of the present invention is illustrated in  
10 Figure 3. Again, identical parts to those of Figure 1  
11 have been given the same reference numeral while like  
12 parts are given the same reference numeral but are now  
13 suffixed 'B'. In this embodiment the gearing arrangement  
14 38B is a rack and pinion system. Spindle 40B, the  
15 pinion, is attached to motor 42. As spindle 40 rotates,  
16 teeth 54 engage with similar teeth 56 on the rack 41B  
17 located on the side of the ejector lever 28. It will be  
18 appreciated that the spindle 40B may be rotated in either  
19 direction to move the ejector lever 28 upwards or  
20 downwards as required. Additionally the spindle 40B may  
21 be mounted at right angles to the motor so that teeth 54  
22 are perpendicular to teeth 56.

23  
24 Reference is now made to Figure 4 of the drawings which  
25 illustrates a release hook, generally indicated by  
26 reference numeral 10C, according to an embodiment of the  
27 present invention. Like parts to those of Figures 1 to 3  
28 have been given the same reference numeral but are now  
29 suffixed 'C'. In this embodiment, catch 36C and ejector  
30 lever 28C are of single piece construction. They are  
31 mounted on a pivot 37 on which they can rotate. Rotation  
32 is provided from a drive sprocket 38C on which the motor  
33 42C is mounted. An associated gear box 39 is also

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12

1 provided. The motor 42C is operated remotely as  
2 hereindescribed with reference to the earlier Figures.  
3 In use, hook 10C, via the catch 36C guides a cable, link  
4 or the like (not shown) into the opening 18C. This is  
5 achieved by rotating the catch 36C and lever 28C on the  
6 pivot 37, in a clockwise direction by use of the motor  
7 42C. Catch 36C will then meet lip 24C and formed a closed  
8 area in which the cable is held. When the cable requires  
9 to be released, the catch 36C and lever 28C are rotated  
10 on the pivot 37, in an anti-clockwise direction. Catch  
11 36C moves away from the hook 10C, ejector lever 28C  
12 pushes the cable along the surface 34C and when the  
13 ejector lever 28C reaches the lip 24C the cable will fall  
14 from the hook 10C. As the catch 36C is used as a guide,  
15 the cable is less likely to become snagged and  
16 additionally does not require someone to mount the cable  
17 on the hook. Thus this embodiment provides automatic  
18 loading for the hook.

19  
20 It will be appreciated by those skilled in the art that a  
21 double cam may have to be incorporated with the drive  
22 sprocket in order to achieve rotation in both a clockwise  
23 and anti-clockwise direction of the catch 36C and ejector  
24 lever 28C.

25  
26 Reference is now made to Figure 5 of the drawings which  
27 illustrates a pad-eye of the hook according to an  
28 embodiment of the present invention. Pad-eye 16D  
29 comprises a one piece body having a shaft 58 and a base  
30 60. The base 60 may be of any shape provided that it is  
31 retained within the body 12 of the hook 10 and the body  
32 12 can swivel freely through 360 degrees on the pad-eye  
33 16D. In the embodiment shown the shaft 58 and base 60 are

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13

1 'T' shaped. Shaft 58 includes an aperture 62 through  
2 which a connection can be made. Aperture 62 is  
3 cylindrical having rounded edges to prevent rubbing on  
4 cables or connectors. In use, pad-eye 16D is mounted  
5 between the two sections of the body 12 and the shaft 58  
6 is located though an aperture 64 formed at the join  
7 between the sections of the body 12.

8  
9 Reference is now made to Figure 6 of the drawings which  
10 illustrates a pad-eye according to a further embodiment  
11 of the present invention. Pad-eye 16E is identical to  
12 pad-eye 16D of Figure 5 except for the shaft. The shaft  
13 66 of this embodiment has no aperture. Shaft 66 includes  
14 a threaded portion 68 at a distal end 70 of the shaft 66.  
15 In use, pad-eye 16E is located into the body 12 of the  
16 hook 10 in an identical manner to that of pad-eye 16D  
17 while the threaded portion 68 is screwed into a threaded  
18 hole located in a crane block. This embodiment offers the  
19 advantage of taking the crane block out of the work area.

20  
21 A principal advantage of the present invention is that it  
22 provides a lightweight and compact release hook compared  
23 to the prior art. This is achieved by removing the  
24 requirement of having a hydraulic ram with the associated  
25 pump and drive means generally needed with such release  
26 hooks.

27  
28 A further advantage of the present invention is that the  
29 hook is composed of detachable parts, so that access can  
30 be given to the internal workings for replacement and  
31 repair. For example, battery 44 will need to be replaced  
32 or recharged at intervals.

33

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14

1 A yet further advantage of an embodiment of the present  
2 invention is that a catch can be provided which both  
3 guides a cable, link or the like onto the hook and  
4 retains it on the hook until ejected.  
5  
6 It will be appreciated by those skilled in the art, that  
7 further modifications may be made to the invention as  
8 described herewith without departing from the scope  
9 thereof. For example, alternative gearing arrangements  
10 driven from a motor could be used. Equally, the motor  
11 could be driven by a different power source than battery  
12 as long as they do not require any external connections  
13 to the hook which would prevent the hook from swivelling  
14 freely.

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15

1 CLAIMS

2

3 1. A release hook as claimed in a release hook for  
4 selectively releasing a load supported on the hook,  
5 the hook including an ejector lever for releasing the  
6 load from the hook upon actuation of the ejector  
7 lever wherein actuation of the ejector lever is  
8 provided by a motor and gearing means located  
9 adjacent the ejector lever.

10

11 2. A release hook as claimed in Claim 1 wherein the  
12 motor is remotely operated.

13

14 3. A release hook as claimed in Claim 1 or Claim 2  
15 wherein the motor is an electric motor driven from a  
16 battery located in the hook.

17

18 4. A release hook as claimed in any preceding Claim  
19 wherein the hook comprises a housing having two  
20 interconnected generally 'C' shaped sections with the  
21 ejector lever being located at a base of the 'C'  
22 between the sections.

23

24 5. A release hook as claimed in Claim 4 wherein the  
25 sections are bolted together.

26

27 6. A release hook as claimed in any preceding Claim  
28 wherein the hook includes a catch.

29

30 7. A release hook as claimed in Claim 6 wherein the  
31 catch comprises an elongate member attached to the  
32 ejector lever.

33



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- 1 8. A release hook as claimed in Claim 7 wherein the  
2 elongate member and the ejector lever are oppositely  
3 opposed on a pivot.  
4
- 5 9. A release hook as claimed in any preceding Claim  
6 wherein the gearing means comprises a rack and  
7 pinion.  
8
- 9 10. A release hook as claimed in Claim 9 wherein the  
10 pinion is operable via the motor and the rack is  
11 located on the ejector lever.  
12
- 13 11. A release hook as claimed in any one of Claims 1 to 8  
14 wherein the gearing means comprises a worm gear.  
15
- 16 12. A release hook as claimed in Claim 11 wherein the  
17 motor turns the worm whose screw thread is located  
18 against matching notches on an edge of the ejector  
19 lever.  
20
- 21 13. A release hook as claimed in Claim 8 wherein the  
22 gearing means comprises a drive sprocket, driven by  
23 the motor to rotate the ejector lever.  
24
- 25 14. A release hook as claimed in Claim 13 wherein the  
26 gearing means rotates the catch with the ejector  
27 lever.  
28
- 29 15. A release hook as claimed in any preceding Claim  
30 wherein the hook includes a pad-eye.  
31
- 32 16. A release hook as claimed in Claim 15 wherein the  
33 pad-eye includes an eye-let aperture such that a link

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17

1 may be made between the pad-eye and a crane block of  
2 a crane.

3  
4 17. A release hook as claimed in Claim 15 wherein the  
5 pad-eye comprises a shaft including connection means  
6 to a crane block.

7  
8 18. A release hook as claimed in Claim 17 wherein the  
9 connection means is a screw thread on the shaft to  
10 match a threaded recess in the crane block.

11  
12 19. A release hook as claimed in any one of Claims 15 to  
13 18 wherein the pad-eye is swivel mounted on a top of  
14 the hook.

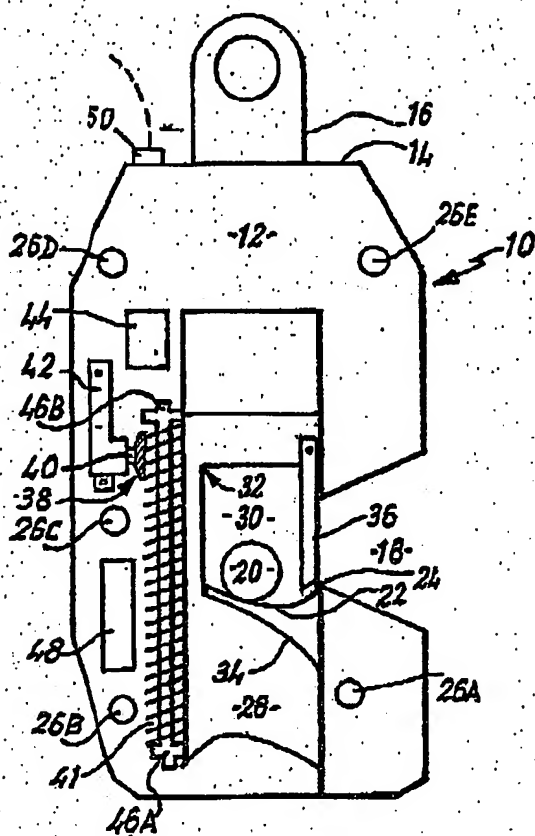
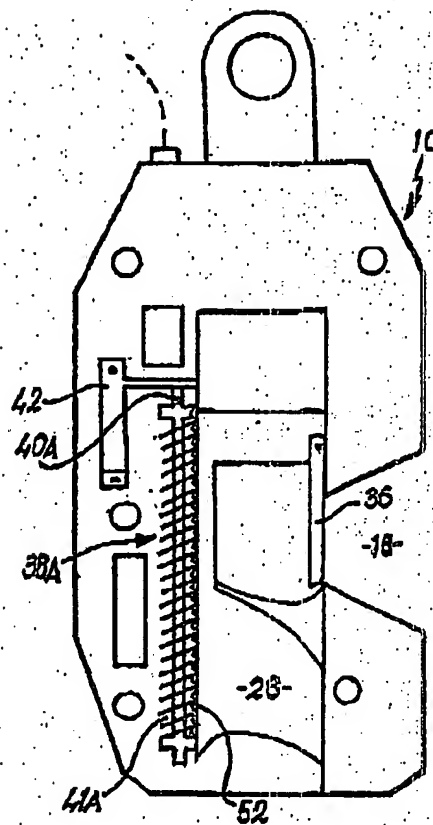
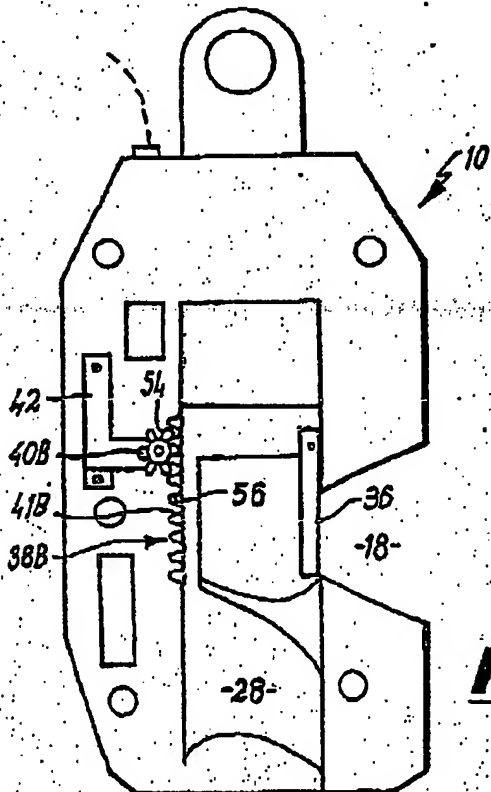
15  
16 20. A release hook as claimed in any one of Claims 17 to  
17 19 wherein the pad-eye includes a base of greater  
18 diameter than the shaft, such that the base is  
19 retained between the two sections of the housing  
20 while remaining rotatable with respect to the  
21 housing.

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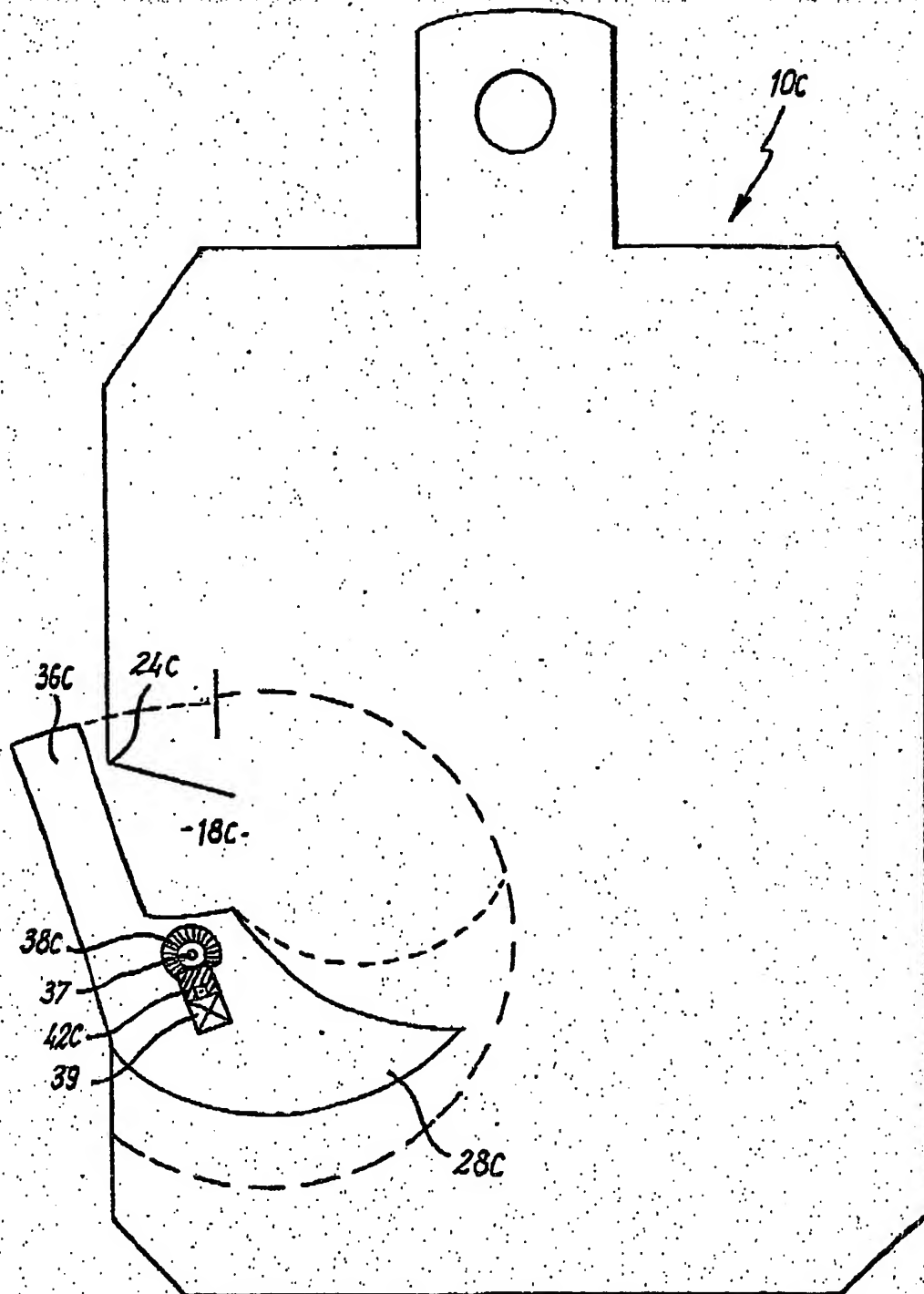
**Fig. 1****Fig. 2****Fig. 3**

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**FIG. 4**

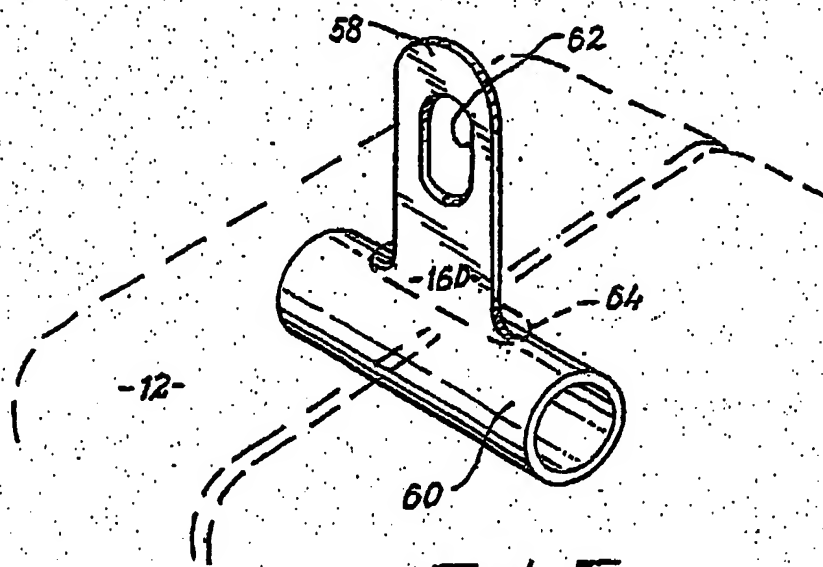
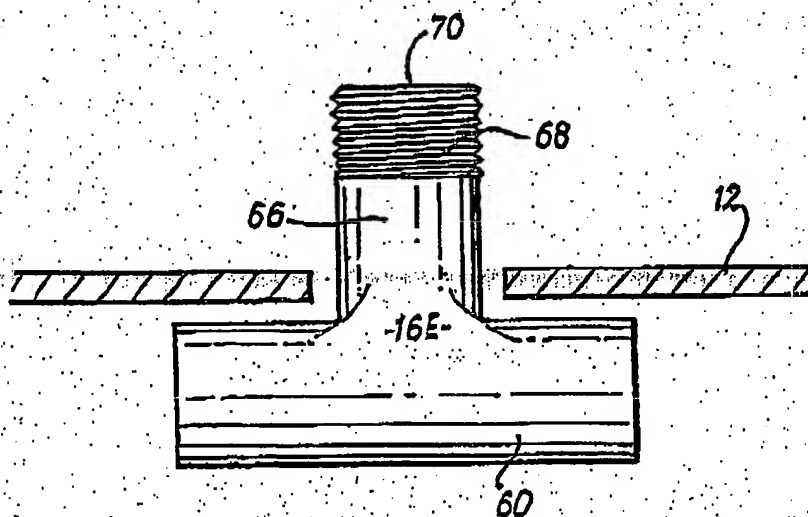
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**Fig. 5****Fig. 6**

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